

REMARKS

Favorable reconsideration of this application in light of the following remarks is respectfully requested.

No claims having been cancelled or added, the Applicant respectfully submits that claims 1-20 remain properly under consideration in this application.

The Applicant respectfully notes that the present Action does not indicate that the drawings have been accepted by the Examiner. The Applicant respectfully requests that the Examiner's next communication include an indication as to the acceptability of the filed drawings or as to any perceived deficiencies so that the Applicant may have a full and fair opportunity to submit appropriate amendments and/or corrections to the drawings.

Rejections under 35 U.S.C. § 102

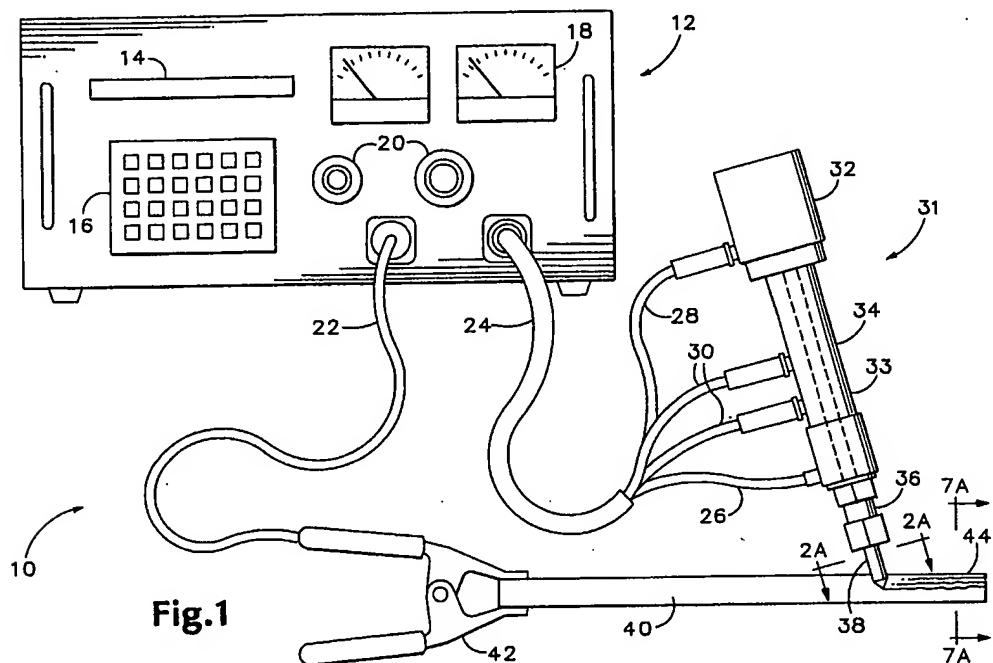
Claims 1, 2, 7-16 and 19-20 stand rejected under 35 U.S.C. § 102(b) as anticipated by Thutt et al.'s U.S. Patent No. 5,448,035 ("Thutt"). The Applicant respectfully traverse this rejection for the reasons detailed below.

The Applicant respectfully notes that Thutt teaches a pulse fusion surfacing (PFS) process in which in FIG. 1 (reproduced below) is described as:

As the applicator 31 is moved horizontally along the surface of blade 40, control signals on line 28 signal stepper motor 32 to move electrode 38 in a dual rotation/oscillation motion, and individual bursts of energy are transmitted to the electrode 38 through line 30. Thus, energy is discharged from console 12 to electrode 38, and transferred in the form of a spark

from the electrode 38 to knife blade 40. *This spark transfers material from electrode 38 onto the surface of blade 40.* The high energy spark alloys the electrode material into the substrate 40 providing a stronger [sic] bond than standard achieved with evaporation and sputtering techniques. The short duration of the spark, less than about 40 microseconds, limits the total energy [sic] delivered to the surface, and limits the temperature increase of the substrate.

Thutt, col. 5, line 55 to col. 6, line 2 (emphasis added).



The Applicant also notes that Thutt teaches with respect to FIG. 2B (reproduced below) that:

FIG. 2B is an enlarged cross-sectional view of the electrode shown in FIG. 1 showing electrode motion according to the invention. The stepper motor 32 (FIG. 1) superimposes electrode rotation upon electrode oscillation to eliminate the control and surface consistency problems explained above.

The electrode 38 is oscillated to prevent welding, while the superimposed rotation motion eliminates electrode flattening as shown in FIG. 2A.

For example, starting from line 218, in one oscillation cycle, the electrode is rotated counter-clockwise to line 220 and then clockwise to line 222.

The duty cycle (i.e., the amount of counter-clockwise rotation vs. the amount of clockwise rotation of electrode 38 for one oscillation cycle) for

the counter-clockwise movement from line 218 to line 220, however, is slightly less than the clockwise portion of the vibration cycle from line 220 to line 222. In the next oscillation cycle, the electrode moves counter-clockwise from line 222 to line 224 then clockwise to line 226. Notice the electrode 38 continues to move further in a counter-clockwise direction each oscillation cycle. Thus, an overall rotational motion is superimposed on the oscillating electrode 38 as illustrated by directional arrow 230. Alternative oscillation patterns which also result in rotation of the electrode through an angle of greater than 360 degrees may be devised and employed for particular applications.

Thutt, col. 6, lines 24-50 (emphasis added).

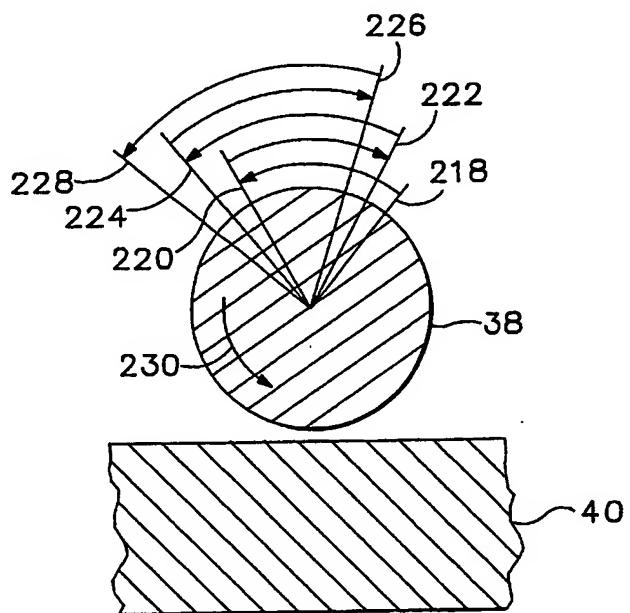


Fig. 2B

The Applicant maintains that the apparatus and method detailed in Thutt and, particularly as illustrated in FIG. 2B, does not involve contact between the electrode 38 and the object 40 on which the electrode material is being deposited. The Applicant contends, therefore, that Thutt does not teach or suggest the "friction" component of the electro-friction welding recited in the claims.

The Applicant also notes, as highlighted above, that Thutt teaches operating the apparatus in a manner that will avoid “welding.” The Applicant contends, therefore, that no teaching or suggestion has been identified in Thutt that would lead one of ordinary skill in the art to practice a method of welding that includes the steps of:

bringing a working surface of the consumable material *into contact* with a base surface of the base material, the working surface being *urged against the base surface by a contact force*, the contact force being applied generally along an axis substantially normal to the base surface;

moving the working surface relative to the base surface while maintaining the contact force, thereby *generating frictional heating* within the welding zone;

as recited in claim 1 (emphasis added) of the present application. The Applicant respectfully notes that each of the other independent claims, specifically claims 7, 11, 13, 16 and 19, include similar language. Because Thutt does not teach or suggest that the movement of the electrode relative to the substrate imparts any frictional heating contribution to the welding process, the Applicant respectfully contends that Thutt cannot anticipate any of the pending claims under 35 U.S.C. § 102.

With respect to the cited portions of Thutt, col. 5, line 20 to col. 6, line 24, Action at 3, the Applicant contends that the “contact” referenced relates to electrical contact across the gap as illustrated in Thutt’s FIGS. 2A and 2B and the impact on the spacing and current flow characteristics. With respect to the “frictional characteristics,” col. 6, lines 6-14, the Applicant contends that this passage relates to the changes from the base material imparted by the formation of the film of foreign material on the surface of the base material and not to any “friction” between the electrode and the substrate. Accordingly, the Applicant contends that the Action does not identify any teaching or suggestion sufficient to establish that Thutt teaches each of the steps of the claimed

method or each of the physical elements of the claimed apparatus arranged in the manner recited in the claims.

The Applicant further contends that Thutt, like Antonov before, is directed to the formation of a relatively thin surface layer on a base material, rather than true “welding,” which involves some melting of the base material, in accord with the present invention.

The Applicant respectfully requests, therefore, that these rejections be reconsidered and withdrawn accordingly with respect to claims 1, 2, 7-16 and 19-20.

Allowable Subject Matter

The Applicant notes with appreciation the Examiner’s indication that claims 3-6 and 17-18 are objected to as depending from a rejected base claim and would, therefore, be allowable if rewritten in independent form incorporating limitations of all included claims. For the reasons detailed above, however, the Applicant respectfully contends that the base claims are also allowable over the applied references and, consequently, the dependent claims need not be rewritten.

CONCLUSION

In view of the above remarks, the Applicant respectfully submits that each of the pending rejections has been addressed and overcome, leaving the present application in condition for allowance. A notice to that effect is respectfully requested.

In the event that all of the pending claims are not deemed allowable, the Applicant notes that no amendments have been made to the pending claims and, accordingly, any new rejections should be presented in a non-FINAL Office Action.

If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned at the number indicated.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge any underpayment or non-payment of any fees required under 37 C.F.R. §§ 1.16 or 1.17, or credit any overpayment of such fees, to Deposit Account No. 08-0750, including, in particular, extension of time fees.

Very truly yours,

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